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13 January 1966

EVALUATION OF FINAL REPORT ON PAR 213

A. BACKGROUND

1. In view of the potential of color photography playing an important role in the intelligence community, [] under PAR 213- [] was given the task of investigating and determining the most suitable means to reproduce and utilize multiple copies of color materials. Included in this broad task were specific tasks as follows: (a) Determination of the most suitable materials for color reproduction systems, (b) Types of equipment to be used in all phases of the reproduction cycle, (c) Define how color photography can best be utilized by the photo interpreter.

2. Work on this project began on 6 December 1963 and was completed, with the final report dated 15 April 1965, at a cost to the Government of []

B. EVALUATION

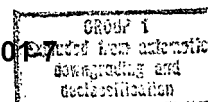
1. The first impression gained from the final report is that [] has performed an adequate job in reporting on color reproduction systems. However, when analyzing the basic task which, is to "INVESTIGATE AND DETERMINE THE MOST SUITABLE REPRODUCTION SYSTEMS", it is obvious that this project has not yielded the maximum information regarding exploitation of color materials.

2. Based on the results of their study, [] has recommended: (a) The use of SO-121 material where high contrast is desired in the reproduced transparency, (b) The use of SO-271 for a medium contrast transparency reproduction, and (c) Type SO-344 for a low contrast transparency reproduction material. Although the evaluations performed by [] substantiate these recommendations, the evaluations were limited to [] products only. It is possible that other manufacturers' color products could have applied to many of these reproduction requirements. Although [] is likely to favor their own products, there is no indication, in the final report, that other products had been given consideration.

3. A portion of this program involved a study of printing techniques including additive and subtractive printing methods. The information and block diagrams on this subject, were presented in an excellent manner, however, these techniques are not new and can be found in published texts dealing with color printing methods.

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4. Significant information on stereo viewing of color materials resulted from the study. Due to the resolution limits on present color acquisition materials, the practicality of viewing color transparency material from high altitude missions is extremely limited. Additionally, the original material, SO-121, due to high altitude haze conditions, is of very low contrast and lacks color saturation. The contrast and color saturation can be greatly improved by contact dupe printing on to the same material, SO-121. For stereo viewing of high altitude materials, the best results can be obtained by using the dupe positive in conjunction with a positive produced from a B&W 3404 type acquisition film, exposed simultaneously with the original SO-121 color material. When viewing this B&W/color stereo pair, a medium color saturation is seen with excellent sharpness. This effect is obtained by the inherently sharper black and white positive plus the color signatures from the high contrast color dupe. It is worth noting that to gain the maximum advantage of viewing a black and white/color stereo pair, requires the insertion of a neutral density filter over the black and white side. This technique subdues the black-and-white image brightness (but not the sharpness) thereby increasing the apparent color saturation of the stereo image. To avoid handling neutral density filters, the use of a polarizing system in each optical path would simplify stereo viewing systems.

5. The following materials have been recommended for particular features in the reproduction systems:

(a) Transparency Positives - Contact Dupes:

- (1) Type SO-121 - A high contrast, relatively high resolution material - excellent for reproduction of low contrast, low saturation, original high altitude materials.
- (2) SO-271 - A medium contrast product having lower resolution than SO-121.
- (3) SO-344 - High resolution, low contrast product - excellent for color copies of low altitude acquisition.

(b) Internegative Materials - Two internegative materials are recommended as an intermediate stage in producing contact and enlarged hard copy color prints.

- (1) Internegative film type 5270 is the best medium for contact printing from the color original to produce hard copy enlargements. It has excellent resolution and color fidelity characteristics.
- (2) Ektacolor internegative film is recommended for enlarging directly from the original. Due to its low resolution characteristics this medium is not practical in contact printing from the original acquisition material.

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(c) Print Materials:

(1) Ektacolor Print Film is recommended to produce enlarged print transparencies from either of the two internegative materials. This product has excellent color fidelity but is resolution limited.

(2) Ektacolor professional print paper is recommended for enlarged reflection color prints produced from either of the two internegative materials.

6. Equipment recommendations: Based on the study, [] has attempted to specify the type of printing, processing and viewing equipment needed for the exploitation of color materials. Most of their recommendations are broad in nature with no specific design possibilities stressed. They recommend investigation into the use of a modified Niagara or Colorado type printer for continuous contact printing. Also, that we should try and utilize the tri-color (narrow band filter) technique in the development of any color printers. This technique as stressed in this report has been proven to produce a superior product over the white light (color compensating filter) technique. It is worth noting that the approved "breadboard" of the briefing print enlarger (BPE), although primarily a black and white printer, has color printing capabilities utilizing the tri-color technique. Another worthwhile consideration, by [] is a variable area, intensity, and color balance transparency viewer, capable of handling long lengths of film, 70mm to 9.5 inches wide, and having a viewing area at least 30 inches long.

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7. Summary: Although [] has done a fine job in reporting on [] film and print materials for reproduction systems, the task of reviewing color materials for exploitation systems is not complete until other manufacturers' comparable products have been evaluated. Also the reproduction method of positive-to-positive (transparency-to-reflection print) directly has not been discussed in the review at all. Until these tasks have been completed, it would be unwise to commit ourselves on any specific color equipment development program. We should, however, keep in mind for future development products, the following: (a) A stereoscope with individual polarizing eyepieces for B&W/color stereo pairs, (b) The modification of a Niagara type printer for a continuous contact color printer, (c) Tri-color printing method or techniques to be employed in all type color printers, (d) A color transparency viewer with variable area, intensity, and color balance capabilities.

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